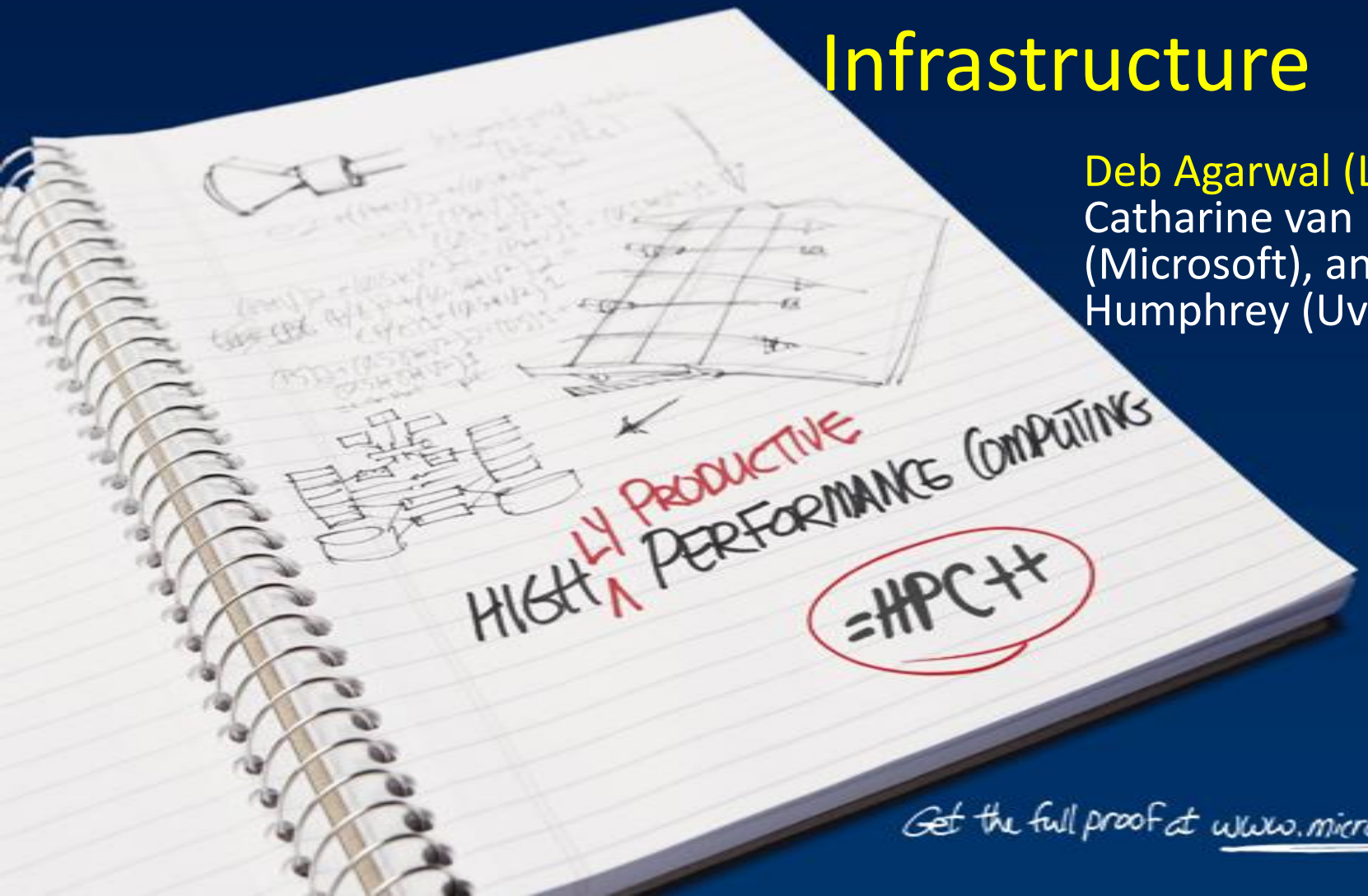
Windows HPC Server 2008

Microsoft

Berkeley Water Center Eco-Science Infrastructure

Deb Agarwal (LBL), Catharine van Ingen (Microsoft), and Marty Humphrey (Uva)

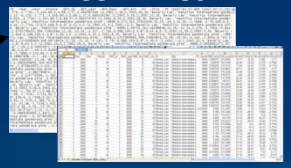


Get the full proof at www.microsoft.com/hpc

Ecological Data

- Data comes from many sources
  - Multiple entities fly satellites and operate fixed sensors – imagery from NASA, precipitation from NOAA, discharge from USGS, water quality from EPA
  - Scientists take data in field campaigns, sensor or other instrument deployments, photographs
  - Collecting site properties such as channel cross-section or leaf area index done by individuals as well as agencies
- Data repositories not universal
  - passed around in e-mail
  - edited at will
  - silently corrected in repositories when "everybody knows"
- Data comes from unexpected places
  - Published literature supplies various numbers and graphs giving context, sanity checks on the results
- Analysis routines usually custom

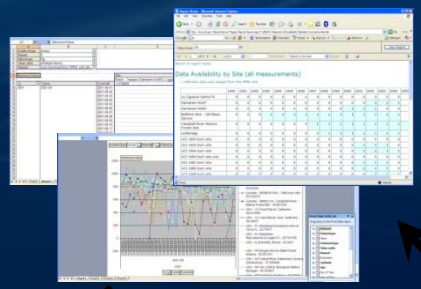
Agency web sites, streaming sensor data, or other source

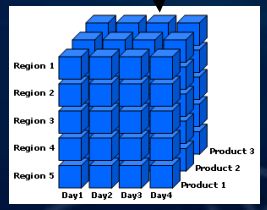


CSV Files

BWC SQL Server Database

Reports, Excel Pivot Table, MatLab, ArcGIS





BWC Data Cube

Example Dataset - FLUXNET

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- Global carbon flux and micrometeorological measurements
  - 960 site years of data
    - 40 variables and 60 quality tags
    - 1/2 hourly measurements
  - 253 sites
  - ~120 site investigators (collecting data)
  - 72 synthesis paper proposals involving ~110 collaborators
- Goal: Understand the role of photosynthesis in carbon cycle

Developing Common Infrastructure

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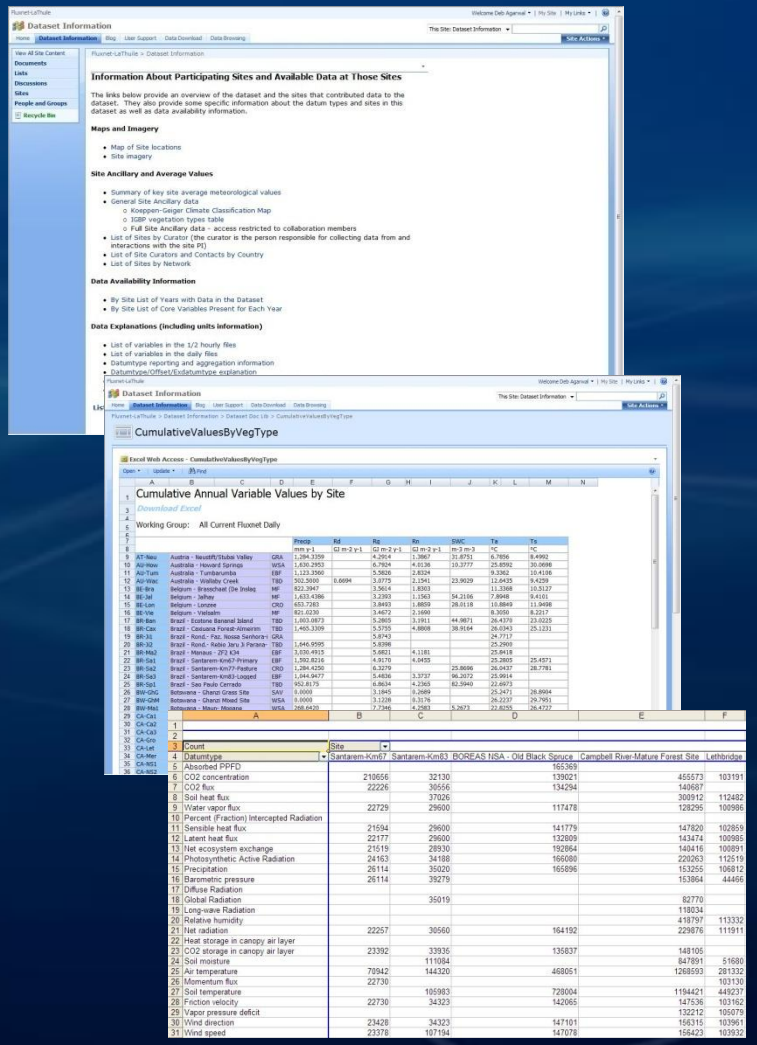
- Data ingested into a database
- Database schema organized by dataset, site, time, and variable
- On-line analytical processing (OLAP) data cubes provide browsing access
- Reports provide web pages describing the data
- Ancillary data gathered and curated
- Collaboration tools facilitate communication between data providers and data users as well as between data users



Interaction and Visualization

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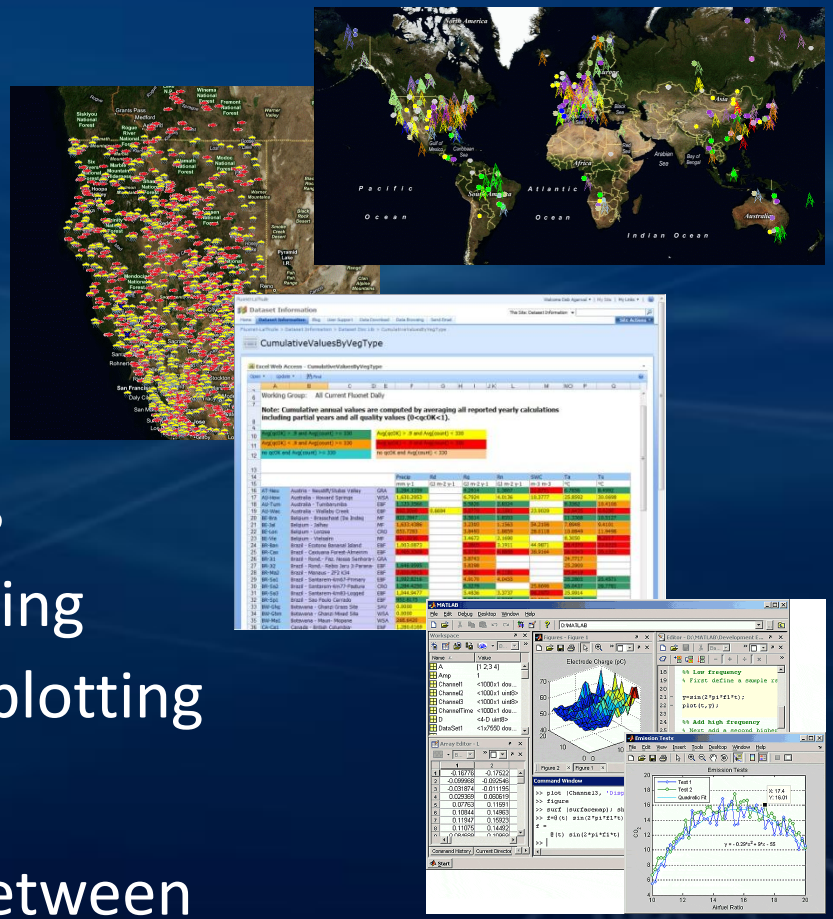
- Mashup maps
  - locate sensors
- Data summary reports
  - Data browsing
  - Data selection
  - Cross-site information
- OLAP data cube interfaces
  - Matlab – analysis and plotting
  - Excel – data browsing and plotting
- Collaboration capabilities
  - Improve communication between data producers and data consumers



Leveraging a Common Approach and Technology Base

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Established Projects

- Russian River
  - Digital watershed built from existing data to look at changes over time affecting salmon
- Carbon Flux Measurement Network
  - Regional (AmeriFlux) and global (FLUXNET) datasets compiled from local carbon flux measurements
- Pajaro River
  - Digital watershed built from existing data to look at natural channel flood control alternatives (listed in top 10 “endangered river” in 2006)

Projects Getting Underway Now

- National Marine Fisheries Service
  - Digital watershed to support fish recovery planning for northern California
- California watersheds server
- North American Carbon Program – Carbon flux modeling

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The saga continues at: http://bwc.berkeley.edu and http://www.fluxdata.org

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